ILLUSTRATION STATIONS DIVISION

PROGRESS REPORT
1954-1958

EXPERIMENTAL FARMS SERVICE
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA, ONTARIO

73754-4—1

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PROGRESS REPORT 1954-1958

Illustrations Stations Division

This report, covering the period 1954-1958, is the final report of the Illustration Stations Division. Effective April 1, 1959, the activities of the Division were decentralized and came under the direction of experimental farms and research stations of the Research Branch.

The Division was organized in 1915. The main aims at that time were to demonstrate to farmers the results of research work carried out at the experimental farms and to test the results under various conditions. However, the aims of the Division changed gradually and in recent years the work has been mainly original investigations and corroborative studies. Many of them were done jointly with other divisions of the Experimental Farms Service.

Illustration stations are situated on privately owned farms, under agreement with the owners. These farms are distributed among the major soil and climatic zones, in areas distant from experimental farms. Experiments are designed to study the effect of the environment on response of crops to fertilizer treatment; farm organization and management; suitability of crop varieties; economics of production concerning irrigation; contouring; grass farming; weed control; efficient use of farm machinery; and other farm practices.

During 1958, research and development studies were conducted on 211 illustration stations in 26 districts across Canada. The stations in each district were supervised by an experimental farm, and district boundaries often cut across provincial boundaries. For instance, two stations in Quebec were supervised from Charlottetown, P.E.I., eight other stations in Quebec were supervised from Kapuskasing, Ont., and two in British Columbia from Beaverlodge, Alta. The numbers of stations supervised by the various experimental farms were:

Supervising Experimental Farm, or District	Number of Illustration Stations Supervised
St. John's West, Nfld.	4
Charlottetown, P.E.I.	8
Kentville, N.S.	7
Nappan, N.S.	9
Fredericton, N.B.	13
Ste-Anne-de-la-Pocatière, Que.	10
Normandin, Que.	5
Lennoxville, Que.	8
L'Assomption, Que.	8
Central Experimental Farm, Ottawa, Ont.	
Eastern Ontario District	7
North Central Ontario District	7
Northwestern Ontario District	2
Kapuskasing, Ont.	13
Brandon, Man.	15
Indian Head, Sask.	12
Melfort, Sask	9
Scott, Sask.	12

Supervising Experimental Farm, or District	Number of Illustration Stations Supervised
Swift Current, Sask.	20
Lethbridge, Alta.	7
Lacombe, Alta.	8
Beaverlodge, Alta.	7
Prince George, B.C.	7
Kamloops, B.C.	5
Creston, B.C.	1
Agassiz, B.C.	3
Saanichton, B.C.	4
Total, 26 districts	211

The stations are listed by provinces later in this report. Much of the work carried out in each district is reported in greater detail in progress reports prepared by the experimental farm concerned.

From 1954 to 1958 the work of the Division was directed by Mr. A. E. Barrett, who was appointed Chief in January, 1954. During the same period, one member of the staff, Mr. J. K. Knights, Fort William, Ont., died. Officers who were promoted to other posts in the Department or resigned from the Department include Messrs. B. C. Appleby (Prince George, B.C.), R. Bernier (Kapuskasing, Ont.), R. R. Cairns (Ottawa, Ont.), E. H. Gardner (Saanichton, B.C.), M. F. Gillis (St. John's West, Nfld.), and S. H. Pawlowski (Beaverlodge, Alta.).

During this period the following research officers were appointed: Messrs. J. L. Dobb (Beaverlodge, Alta.), J.-M. Girard (Normandin, Que.), G. K. Harris (Swift Current, Sask.), R. E. Laurin (Melfort, Sask.), J. R. Lessard (Kapuskasing, Ont.), E. F. Maas (Saanichton, B.C.), O. S. Mabee (St. John's West, Nfld.), G. A. MacEachern (Prince George, B.C.), and W. L. Pringle (Kamloops, B.C.). Mr. W. B. Towill, formerly of the Illustration Station Division, Scott Experimental Farm, was appointed to the post at Fort William.

ILLUSTRATION STATIONS

Two hundred and eleven illustration stations were in operation in 1958. The names of the co-operating farmers, the stations in each province and the years they were established were:

Location by Province	*Co-operating Farm Owner**	*Year Station Established*
NEWFOUNDLAND (4)		
Avondale	Crown land (Blueberry Station)	1953
Cormack	Pierce Upward	1954
Doyles	George Cormier	1952
Lethbridge	James Harris	1951
PRINCE EDWARD ISLAND (6)		
Alliston (Murray River)	T. A. Hicken	1935
Armadale (Monticello)	Hugh J. MacDonald	1938
New London	Wm. E. Johnstone	1928
O'Leary	Robert Woodside	1948
Rose Valley (Breadalbane)	John W. MacKenzie (1937)	1923
Urbinville (Wellington)	Zenon Gallant	1945

Location by Province	*Co-operating Farm Owner**	*Year Station Established*
NOVA SCOTIA (16)		
Amherst	Charles Read	1957
Aylesford	C. S. Bezanson, M. P. Nichols, C. E. Smith	1941
Barss, Corners	McLearn Taylor	1958
Big Pond	Alex. MacIntyre	1951
Bras-d'Or	Neil Patterson	1958
Clarence	R. Barteaux	1958
Glenora Falls (Mabou)	Joseph Beaton (1951)	1947
Goshen	Roy Sinclair	1951
Knoydart (Merigomish)	D. M. Sinclair	1929
Lunenburg (Lilydale)	W. I. Falkenham	1933
Mavillette	J. R. Deveau	1942
New Glasgow	E. V. Paine	1948
Rawdon Gold Mines	Winston Meehan	1955
Salt Springs (West River)	Fred Setchell	1929
Tatamagouche (Brule)	Douglas Tattrie	1951
Yarmouth (Wellington)	John Jensen	1954
NEW BRUNSWICK (13)		
Baker Brook (Crockett)	Claude Levasseur	1945
Belleisle Creek (Norton)	Howard O'Neil	1954
Cumberland Bay (Point)	Robert Beam (1956)	1941
East Centreville	Ernest Emery	1942
Lower Derby	Arnold Taylor (1958)	1921
Millville	Allison Hawkins	1955
Mont-Carmel	Cloris Melanson	1942
St-Isidore	Peter Robichaud	1927
St-Quentin	Fernand Dubé (1955)	1946
Salisbury	Truman Lewis (1930)	1927
Salmonhurst	Jens Larsen	1950
Siegas	Roméo Ruest (1933)	1925
South Tetagouche (Bathurst)	William Oliver	1954
QUEBEC (41)		
Amos	Léonel Cossette	1949
Amqui	Eugène Belzile	1949
Batiscan	Mrs. A. Brunelle (1956)	1938
Cap-Chat	Philippe Labrie	1952
Cap-Santé	Eugène Bertrand	1957
Cloutier (Noranda)	Ovide Gauvin	1949
Ferme-Neuve	Jean Godbout	1955
Frelighsburg	Armand Millaire	1955
Granby	Isidore Martin	1951
Grandes-Bergeronnes (Bon-Désir)	Albert Simard (1942)	1934
Grindstone (Boisville)	Edvard Bouffard	1951
Guyenne	Guy Rivest	1955
Honfleur (St-Anselme)	Marius Dion (1958)	1955
Lac-Ste-Croix	Charles Pelletier	1958
Lamorandière	Napoléon Letourneau	1952
La Patrie	Louis Langlois	1946
L'Assomption	Harmel Turgeon	1956
Laverlochere	Albéric Trudel (1947)	1932
L'Islet	Joseph C. Lemieux	1929
Macamic	Romuald Morissette	1956
Maskinongé	Ozani Caron (1956)	1944
Mont-Brun	Georges Mercier	1953
Notre-Dame-du-Bon-Conseil	Lucien Lambert	1950
Notre-Dame-du-Lac	Olivier Boucher	1958
Péribonca	Joseph Savard	1940
Portage-du-Cap (Amherst Is.)	Aldéric Lapierre	1953

Location by Province	*Co-operating Farm Owner**	*Year Station Established*
Rivière-du-Loup	Adélard Nadeau (1958)	1948
St-Cœur-de-Marie (Delisle)	Joseph Brassard	1956
St-Etienne-des-Grés	Roger Bournival (1946)	1920
St-Flavien	Albert Laroche	1944
St-Grégoire	Mrs. F.-I. Bouvet (1952)	1947
St-Jacques-de-Montcalm	Paul Marsolais	1945
St-Paul-de-Montminy	Hilaire Gaudreault	1939
St-Pierre-d'Orléans	Joseph Pichette	1957
St-Sébastien	Paul Lachance (1957)	1947
St-Tite	Gérard Carpentier	1957
St-Urbain (Baie-St-Paul)	Adrien Harvey (1951)	1948
St-Vallier	Albert Aubé	1935
Ste-Victoire	Rolland Daoust	1955
Thetford Mines	Emile Couture	1947
Ville-Marie	Emilien Rivest	1957
ONTARIO (21)		
Appleton (Carleton Place)	Duncan W. Stewart	1945
Bloomfield	Holmes Matthie	1938
Casselman	Léo Paul Laflèche (1954)	1924
Dayton	John A. Boville (1954)	1948
Douglas (Cobden)	Duncan McLaren	1948
Earlton	Albert Rivard (1948)	1941
Eau-Claire	Nigel & James Graham	1955
Fort Frances	William & Amos Lowe	1951
Fort William	Campbell Hanna	1937
Fournier (Plantagenet)	Leonard McCulloch	1937
Genier (Cochrane)	Albert Tousignant	1948
Gore Bay, Manitoulin Is.	Cameron G. Clark (1946)	1945
Lyn (Brockville)	Philip H. McNish (1957)	1945
Manitowaning, Manitoulin Is.	Lloyd J. Kerr	1945
Matheson	Gerald Scratch	1948
Mattagami Heights (Timmins)	J. B. Levesque	1953**
Mindemoya, Manitoulin Is.	W. &. P. Williamson	1945
Moonbeam	Frédéric Lebrun	1958
Noelville	Raoul Carrière (1945)	1938
Verner	Ernest Beaudry (1945)	1927
Williamstown	Malcolm MacRae (1958)	1940
MANITOBA (15)		
Ashern	Frank Self	1950
Beausejour	Edward Modrzejewski	1953
Boissevain	C. C. Musgrove & Son	1938
Durban	R. C. & H. W. Harvey	1949
Goodlands	Clinton and Stewart Bell (1945)	1935
Grandview	Sherman Clark	1950
Hargrave	H. C. Odell	1939
Katrime	W. A. Heselwood (1949)	1928
Kenville	H. A. Loat	1946
Lenswood	Arthur Utting	1940
Lyleton	G. H. Edgar	1935
Morris	Edward D. Berard	1949
Pipestone	Harold Forder (1945)	1926
Silverton	Joseph J. Dunn	1935
The Pas	John Jaegar	1950
SASKATCHEWAN (53)		
Alameda	Gordon & Stanley Young	1935
Archerwill	Selman J. Slind	1950

**Since 1955 on a different farm location, same operator.

Location by Province	*Co-operating Farm Owner**	*Year Station Established*
Arcola	Clarence Marsh (1949)	1937
Aylesbury	Ivan McMillan (1957)	1937
Bracken	Raymond Honey (1955)	1935
Consul	J. Reesor	1950
Conquest	Hugh Kennedy (1950)	1946
Demaine	Wayne Affleck	1958
Dorintosh	J. Sprietzer	1950
Eastend	Wilbert H. Lewis	1949
Eastend	Graham Higgins	1952
Fleming (Moosomin)	Gordon Osborne	1949
Fox Valley	David Mutschler (1939)	1928
Gilroy	Frank Cocks	1951
Glaslyn	S. Wood	1946
Glenbush	John C. Grant	1929
Gravelbourg	J. B. & M. Pinsonneault (1955)	1935
Guernsey	Orval Snider (1956)	1924
Gull Lake	William Sommers	1956
Hafford	Phillip Lommer (1956)	1932
Henribourg	Donat Bolduc	1950
Kelliher	R. L. Church	1950
Kincaid	Wm. C. Phillips	1935
Kindersley	Robert Simpson	1923
Kyle	G. A. Noble	1954
Limerick	J. W. & J. T. Smith (1945)	1935
Lisieux	Omer Préfontaine (1945)	1929
Loon Lake	R. Kisling	1947
Loverna	Allan Brumwell (1946)	1927
Lumsden	Clayton Tindall	1958
Maple Creek	S. N. Colquhoun (1955)	1949
Maple Creek	R. Sandau	1952
Marsden	George Jones	1949
Paddockwood	Sidney Martin (1952)	1932
Pambrun	Fred Jorgensen	1956
Parkside	Godfrey Willoughby (1948)	1935
Pierceland	Sydney Baker	1954
Radville	G. L. Levee & Son (1956)	1924
Rosetown	Peter H. Macey (1947)	1935
Shackleton	C. D. Underwood	1939
Shaunavon	H. Hockett	1940
Snowden	F. S. Brown (1958)	1942
Somme	D. Z. Chute	1953
Star City	T. W. Jacklin & Sons	1947
Strasbourg	Ambrose Coles	1935
Strasbourg	J. G. Hooper	1935
Tugaske	Lindsay Wilson (1949)	1918
Turtleford	Evert Bloom	1951
Valjean	Fred Linquist	1934
Val-Marie	Jack Spiess (1952)	1949
Viceroy	L. L. Gyman	1950
White Fox	Peter Tornquist	1936
Yorkton	Gordon Harris (1957)	1935
ALBERTA (20)		
Acme	Ralph Brown	1953
Athabasca	Joe Eherer	1947
Bindloss	Melvin Russell (1954)	1924
Blueberry Mountain	Jesse Caterer	1955
Bonnyville (Fort Kent)	W. G. Levasseur	1951
Castor	F. M. Pals (1949)	1933
Chedderville (Rocky Mt. House)	Howard Williams	1941
Claresholm	Wes Reid (1955)	1937
Drumheller	L. O. & P. R. Andrews (1945)	1941
Evansburg	Rudolph Weist & Sons	1952
Foremost	C. G. Wolfe	1935
Goodfare	Clayton Third	1942

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Location by Province	*Co-operating Farm Owner**	*Year Station Established*
High Prairie	L. R. Cowell	1951
Leslieville (Oras)	G. N. Lynn (1946)	1938
Metiskow	E. Masson	1937
McLennan	Narcisse Lamoureux	1947
Nobleford	G. J. Withage (1949)	1939
Pincher Creek	Eugene P. Cyr (1944)	1933
Wanham	C. L. Christensen	1955
Whitla	W. N. Babe (1955)	1915
BRITISH COLUMBIA (22)		
Aldergrove	J. A. Jackman	1956
Armstrong	W. B. McKechnie	1925
Baldonnel	H. G. Hadland	1942
Cobble Hill	F. R. Parr	1952
Courtenay	James Casanave	1942
Creston	Creston Reclamation Co.	1938
Darfield	Bruno & Ulrich Schilling	1951
Duncan (Koksilah)	Bert Young	1928
Engen	A. Kulchar	1956
Grassy Plains	B. & A. McGibbon	1952
Houston	Peter Ruiter	1948
Ladner	Murray Davie	1952
McBride	A. E. Long	1941
144 Mile House	Orville Fletcher	1957
Mount Cartier	R. Hold	1947
Nanaimo	A. C. Galloway	1952
North Pine	Albert Germain	1953
Pitt Meadows	Cornelius Sluis (1958)	1956
Prince George	Albert Junker	1958
Salmon Arm	J. B. Aten	1958
Terrace	J. F. Karulok	1956
Vanderhoof	John Andros	1944

*Date given in brackets after the name indicates year contract was signed with present operator when this is different from the year the station was established.

Operations at the following illustration stations were terminated during the period 1954-58. The names of the co-operating farm owners and the periods of time that the stations were in operation are also given.

Location	*Co-operating Farm Owner*	*Tenure of Station*
Carbonear, Nfld.	George E. Soper	1951-57
Heatherton, Nfld.	Andrew McDonald	1952-57
Iona, P.E.I.	James E. Daly	1923-55
Noel Shore, N.S.	J. L. Main	1939-57
North East Margaree, N.S.	Thomas E. Ross	1921-58
Stewiacke, N.S.	G. E. Campbell	1949-56
St-Charles, N.B.	Antoine J. Daigle	1929-57
Cap-d'Espoir, Que.	Pierre Décarie	1938-55
Chapeau, Que.	Thomas Kennedy	1951-56
East Broughton, Que.	Ernest Doyon	1943-55
Honfleur, Que.	Alphonse Laliberté	1935-54
L'Acadie, Que.	Charles Deland	1937-56
Lachevrotière, Que.	Rosaire Mayrand	1935-55
Luceville, Que.	Philippe Bouchard	1942-54
Macamic, Que.	Rémi Auger	1936-55
Mont-Rolland, Que.	Paul Latour	1943-54
Notre-Dame-du-Lac, Que.	Gérard Cloutier	1954-57
Pintendre, Que.	Alphonse Couture	1935-55
St-Ambroise, Que.	Mrs. E. Pedneault	1942-55
St-Constant, Que.	Roch Boulé	1921-57
St-Damase, Que.	Armand Beauregard	1951-56
St-Gédéon, Que.	Joseph A. Simard	1946–57

Location by Province	*Co-operating Farm Owner**	*Year Station Established*
St-Nérée, Que.	Lazare Asselin	1937-55
St-Pierre-d'Orléans, Que.	J. Adélard Rousseau	1927-56
St-Prosper, Que.	Eugène Larochelle	1933-55
St-Simon-de-Bagot, Que.	Jean-Marie Rivard	1921-57
Wotton, Que.	Napoléon Corbeil	1939-55
Wotton, Que.	Médard Fréchette	1956-57
Bar River, Ont.	Philip & Keith Barclay	1955-57
Caledonia Springs, Ont.	Henri-J. Gauthier	1930-57
Oxdrift, Ont.	John Corner	1954-57
Arborg, Man.	Victor Shebeski	1924-56
Hargrave, Man.	J. R. Odell	1939-55
Lyleton, Man.	J. G. Parsons	1935-55
Avonlea, Sask.	Joseph Dombowsky	1930-56
Carmichael, Sask.	A. Cecil Butler	1935-54
Carrot River (Smoky Burn), Sask.	River Bend Co-op. Farm Ass'n	1950-57
Estevan, Sask.	James Lamb	1952-54
Wawota, Sask.	William H. Pryce	1924-56
Acadia Valley, Alta.	W. A. Heiden	1939-57
Chauvin, Alta.	E. A. Pitman	1932-56
Craigmyle, Alta.	J. L. Branum	1939-55
Dalroy, Alta.	Lease from C.P.R.	1942-57
Deadwood, Alta.	John Nicklason	1953-55
Hines Creek, Alta.	A. Brauer	1951-57
Hythe, Alta.	R. A. Hill	1952-56
Lomond, Alta.	E. M. Benson	1935-57
Ryley, Alta.	George Lyons & Sons	1950-54
St. Paul, Alta.	J. R. LaFrance	1944-57
Alberni, B.C.	S. J. Darby & Sons	1925-56
Armstrong, B.C.	Levi Johnston	1945-55
Chase, B.C.	R. C. Dunn	1951-56
Fort Fraser, B.C.	W. F. Clarke	1946-54
Pemberton, B.C.	J. C. Collins	1953-56
Quesnel, B.C.	G. Beath & A. Foyle	1934-57
Salmon Arm, B.C.	L. E. Stewart	1940-57
Terrace, B.C.	Peter Van Stolk	1950-55

AGRICULTURAL METEOROLOGY

Precipitation and temperature are recorded daily at many illustration stations. For locations where the Meteorological Division, Department of Transport, does not have a regular meteorological observer, the readings are published by the Department of Transport in "Monthly Record of Meteorological Observations in Canada." In 1957, of the 38 illustration stations in Eastern Canada and 101 in Western Canada that were recording precipitation data, over 70 were co-operating with the Department of Transport.

Precipitation

Table 1 gives the mean annual precipitation (10 inches of snow = 1 inch of rain) and the mean monthly precipitation for the growing season, where available, for 61 of the illustration stations. The monthly precipitation pattern from April to July differs from region to region. The mean monthly precipitation, in inches, for April, May, June, and July, respectively, for stations with 19 to 30 years of records were as follows: in southeastern Saskatchewan 0.86, 1.59, 3.04 and 2.16; in northeastern Saskatchewan 1.02, 1.55, 2.10, 2.39; in southern Alberta 1.03, 1.81, 3.00 and 1.64; in southern British Columbia 2.00, 1.50, 1.75 and 1.14.

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The precipitation patterns for southeastern Saskatchewan and southern Alberta are similar, the precipitation increasing sharply from April to June and then decreasing, whereas the precipitation for northeastern Saskatchewan increases more slowly from April and does not reach a peak until July. The pattern for southern British Columbia is distinctly different; precipitation there decreases in May and rises in June. In Quebec, the data for Amqui, Grandes Bergeronnes and Péribonca indicate a nearly uniform distribution of moisture during the summer months in the eastern part of the province. In the remainder of the province there is usually a peak during June, July or August.

TABLE 1.—AVERAGE MONTHLY PRECIPITATION IN GROWING SEASON AND MEAN ANNUAL PRECIPITATION, AT ILLUSTRATION STATIONS

(Summary to Dates Given)

Station	No. of Years	Year Ending	Growing Season					Mean Annual Precipitation
			April	May	June	July	Aug.	
			in.	in.	in.	in.	in.	in.
QUEBEC								
Amqui	8	1956	2.25	1.89	2.00	2.20	2.10	29.5
Cap-Chat	4	1957	1.62	1.70	3.20	4.20	2.30	30.1
Notre-Dame-du-Lac	3	1957	1.10	1.90	3.40	2.10	1.40	22.7
Grandes-Bergeronnes	4	1956	3.22	3.23	3.02	4.47	3.40	40.6
Péribonca	5	1956	2.44	3.21	3.03	3.98	3.27	34.5
St-Gédéon	5	1956	1.61	2.60	3.16	3.82	3.11	29.2
Amos	8	1956	.....	2.21	2.82	3.48	2.86	34.6
Cloutier	8	1956	.....	1.88	2.74	3.40	2.91	30.8
Guyenne	1	1956	2.25	3.66	1.85	4.34	2.08	28.1
ONTARIO								
Fort William	15	1957	2.25	2.74	3.77	2.90	3.13	30.7
Fort Frances	6	1957	1.62	2.30	4.22	4.14	1.94	24.8
MANITOBA								
Winnipeg and Interlake:								
Arborg	12	1956	.83	1.76	3.12	2.73	.....	.....
Katrime	12	1956	.85	2.02	3.55	2.80	.....	.....
Western Manitoba:								
Boissevain	11	1956	1.22	1.84	5.00	2.14	.....	.....
Durban	8	1956	0.93	1.78	3.35	2.85	.....	.....
Lyleton	12	1956	1.29	2.10	4.23	2.63	.....	.....
Pipestone	12	1956	.92	1.81	4.48	2.86	.....	.....
Hargrave	11	1955	.76	2.04	4.50	2.77	.....	.....
Silverton	12	1956	.83	1.71	4.04	3.76	.....	.....
SASKATCHEWAN								
Southeastern Saskatchewan								
Alameda	22	1957	0.94	1.93	4.02	2.57	.....	18.4
Arcola	21	1957	0.88	1.70	3.44	2.40	.....	16.0
Aylesbury	20	1957	0.85	1.37	2.43	1.92	.....	12.7
Fleming	9	1957	1.15	1.86	4.43	3.98	.....	22.1
Kelliher	8	1957	1.15	1.62	3.58	2.44	.....	17.9
Lisieux	26	1957	0.82	1.67	2.76	1.66	.....	13.0
Radville	22	1957	0.80	1.63	2.81	1.87	.....	15.0[1]
Strasbourg	26	1957	0.81	1.62	2.62	1.95	.....	13.3
Viceroy	8	1957	1.97	1.77	3.56	1.86	.....	18.1
Yorkton	22	1957	0.89	1.23	2.71	2.52	.....	16.1
Southwestern Saskatchewan								
Consul	8	1957	0.84	1.17	2.18	1.88	.....	12.4
Eastend	8	1957	1.11	1.38	2.36	1.99	.....	14.3
Loverna	12	1956	.54	.66	2.46	.99	1.02	.....
Maple Creek	5	1957	1.91	1.46	1.80	2.08	.....	12.1
Val-Marie	7	1957	0.87	1.62	2.52	1.65	.....	12.7

TABLE 1.—AVERAGE MONTHLY PRECIPITATION IN GROWING SEASON AND MEAN ANNUAL PRECIPITATION, AT ILLUSTRATION STATIONS (*Cont'd*)

(Summary to Dates Given)

Station	No. of Years	Year Ending	Growing Season					Mean Annual Precipitation
			April	May	June	July	Aug.	
			in.	in.	in.	in.	in.	in.
Northeastern Saskatchewan								
Archerwill	7	1957	1.11	2.27	2.46	2.42	2.40	20.29
Guernsey	22	1957	1.40	1.57	3.45	2.50	2.37	13.06
Hafford	22	1957	.78	1.14	2.16	1.90	1.66	11.85
Henribourg	7	1957	.89	1.85	1.68	2.21	2.46	14.91
Paddockwood	21	1957	.83	1.48	1.90	2.17	1.97	13.44
Parkside	22	1957	.93	1.59	2.08	2.13	1.97	12.06
Smoky Burn	7	1957	1.24	2.05	2.44	3.80	2.83	19.64
Snowden	15	1957	.96	1.62	2.26	2.66	2.48	15.89
Somme	4	1957	1.54	1.39	3.08	2.43	2.35	18.16
Star City	10	1957	1.15	1.67	2.83	3.10	2.52	20.36
White Fox	21	1957	.92	1.58	1.00	2.76	2.24	16.09
ALBERTA								
Southern Alberta								
Claresholm	20	1957	1.42	2.16	3.21	1.82	.....	17.8[2]
Drumheller	20	1957	1.05	1.57	3.05	2.21	.....	15.8[3]
Foremost	28	1957	0.92	1.61	2.79	1.39	.....	13.4
Lomond	22	1957	0.79	1.71	2.71	1.47	.....	12.6
Nobleford	19	1957	0.97	2.01	3.25	1.29	.....	15.4[4]
Pincher Creek	36	1957	1.73	2.53	3.94	1.56	.....	20.8
Whitla	34	1957	1.00	1.64	2.44	1.42	.....	12.9
Northern Alberta								
Athabasca	10	1956	1.06	1.77	2.24	3.44	.....	.....
Baldonnel	12	1956	1.05	1.19	2.47	2.89	.....	.....
McLennan	8	1956	.67	1.83	2.57	3.21	.....	.....
BRITISH COLUMBIA								
Alberni	63	1957	4.48	2.76	2.09	1.24	.....	68.5
Cobble Hill	43	1957	1.88	1.37	1.27	0.78	.....	35.5
Courtenay	26	1957	2.91	1.85	1.83	1.60	.....	55.5
Creston	18	1955	0.96	1.04	2.01	0.88	.....	17.6
Duncan	32	1957	2.13	1.60	1.41	0.93	.....	39.4
Nanaimo	10	1957	2.28	1.25	1.60	1.22	.....	42.1

[1] 26—yr. av. [2] 29—yr. av. [3] 31—yr. av. [4] 35—yr. av.

Temperature

Table 2 shows the periods free of frost (32° F.) and of killing frost (28° F.) for illustration stations in 1956-57 and the long-term averages for 19 of the stations.

Latent Evaporation

In 1955, the recording of latent evaporation at illustration stations was begun. Duplicate Black Bellani plates (Figure 1) were installed and the daily loss of water was recorded in cubic centimeters. Table 3 gives the data along with the total precipitation and the mean temperatures from June 1 to August 31, 1956 and 1957. The latent evaporation varied considerably between locations for both years.

TABLE 2.—PERIODS FREE OF FROST (32° F.) AND OF KILLING FROST (28° F.) AT STATIONS IN SEVEN PROVINCES, AND LONG-TERM AVERAGES (19 STATIONS)

STATION	1957		Average*		
	32° F.	28° F.	No. of Years	32° F.	28° F.
	days			days	
NOVA SCOTIA					
Glenora Falls	123	152	—	—	—
Goshen	113	170	—	—	—
Yarmouth	153	201	2	138	179
Average	130	174	—	—	—
QUEBEC					
Hebertville (St-Gédéon)	121	124	—	—	—
Péribonca	114	120	—	—	—
Grandes-Bergeronnes	122	137	—	—	—
St-Étienne	115	153	—	—	—
St-Jacques	130	148	—	—	—
Average	120	136	—	—	—
ONTARIO					
Ft. William	97	106	17	97	106
Ft. Frances	123	156	6	117	133
MANITOBA					
Boissevain	129	148	—	—	—
SASKATCHEWAN					
Southeastern:					
Kelliher	92	144	—	—	—
Lisieux	110	116	—	—	—
Viceroy	92	145	—	—	—
Southwestern:					
Consul	92	111	4	97	109
Eastend	86	115	8	82	96
Maple Creek	117	119	4	123	126
Pambrun	98	143	2	99	148
Northeastern:					
Guernsey	97	142	2	109	145
Parkside	114	117	14	103	119
Smoky Burn	93	114	3	98	116
Snowden	75	114	14	80	106
Somme	93	143	14	91	111
White Fox	97	112	3	100	123
Average (Sask.)	97	126	—	—	—
ALBERTA					
*Peace River Region:***					
Baldonnel, B.C.	112	135	—	—	—
Blueberry Mountain	80	116	—	—	—
Goodfare	31	96	—	—	—
High Prairie	79	117	—	—	—
Hines Creek	95	115	—	—	—
North Pine, B.C.	113	143	—	—	—
McLennan	95	143	—	—	—
Wanham	117	145	—	—	—
Average	90	126	—	—	—
BRITISH COLUMBIA					
Alberni	155	170	4	—	171
Cobble Hill	221	308	4	—	254
Courtney	189	217	4	—	220
Creston	—	—	18	127	175
Duncan	192	246	4	—	222
Nanaimo	167	209	4	—	197
Average	185	230	—	—	—

* Period ending 1957.
** 1956 data.

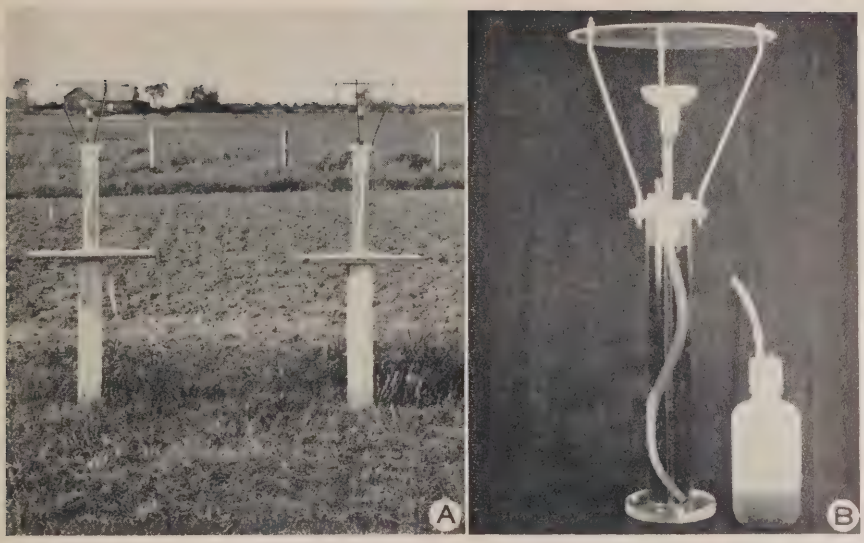

Figure 1.—Black Bellani plate evaporimeter. This instrument is used at selected stations to measure the free-surface evaporation in areas of growing crops.

TABLE 3.—TOTAL LATENT EVAPORATION, PRECIPITATION AND MEAN TEMPERATURES AT 11 ILLUSTRATION STATIONS FROM JUNE 1 TO AUGUST 31, 1956 AND 1957

Station	Evaporation		Precipitation		Temperature	
	1956	1957	1956	1957	1956	1957
	cc.	cc.	in.	in.	°F.	°F.
Glenora Falls, N.S.	2249	2296	9.00	7.94	59.0	60.0
New Glasgow, N.S.	2200	—	8.30	6.90	61.6	62.0
Macamic, Que.	2580	—	10.50	9.80	58.7	60.0
Fournier, Ont.	3439	—	10.90	8.25	64.7	—
Mindemoya, Ont.	—	2617	7.6	7.47	63.0	60.7
Durban, Man.	2700	2541	13.42	7.30	63.3	62.3
Katrime, Man.	3935	3616	9.30	11.14	65.0	64.3
Fox Valley, Sask.	4394	3889	6.23	6.59	64.3	63.7
Loon Lake, Sask.	3467	—	6.71	10.16	61.7	57.3
Snowden, Sask.	2807	3200	7.20	7.05	60.4	59.4
Whitla, Alta.	3813	2409	9.10	3.90	63.0	62.3

SOIL PRODUCTIVITY

A method of measuring soil productivity was outlined. In this study, productivity was considered to be the capacity of a soil to produce a specified crop under a standard system of management. Certain classified soils in the major soil zones of the Prairie Provinces and the Peace River area of British Columbia were compared on the basis of long-term yields of wheat on summer fallow.

The records were taken by illustration station agronomists. The means, standard deviations and standard errors of the yields were calculated and from these the 95 per cent confidence limits of the means (Table 4). These limits show the range within which the true mean occurs at the 95 per cent level of probability.

TABLE 4.—PRODUCTIVITY OF SOILS FOR WHEAT ON SUMMERFALLOW IN THE PRAIRIE REGION OF CANADA

Soil Zone and Station	Soil Class	Period	No. of Crops	Yield Per Acre			
				Mean	Standard Deviation	Standard Error	95% Confidence Limits
				bu.	bu.	bu.	bu.
BROWN							
Bracken, Sask.	Echo C.L.	1936—56	21	14.9	11.3	2.47	9.7—20.1
Fox Valley, Sask.	Fox Valley Si. L.	1927—56	29	15.2	11.8	2.19	10.7—19.7
Gravelbourg, Sask.	Sceptre C.	1936—56	21	22.8	10.0	2.18	18.2—27.4
Kincaid, Sask.	Fox Valley Si. C.L.	1936—56	21	21.3	11.8	2.58	15.9—26.7
Kindersley, Sask.	Sceptre C.	1931—56	26	18.0	10.2	2.00	13.9—22.1
Limerick, Sask.	Haverhill C.L.	1936—56	21	18.5	9.4	2.00	14.3—22.7
Lisieux, Sask.	Wood Mountain L.	1937—56	23	19.5	10.5	2.19	15.0—24.0
Loverna, Sask.	Fox Valley Si. C.L.	1931—56	26	12.7	11.4	2.24	8.1—17.3
Shackleton, Sask.	Sceptre C.	1939—56	18	20.4	10.4	2.45	15.2—25.6
Shaunavon, Sask.	Haverhill C.L.	1940—56	17	20.2	10.4	2.52	14.9—25.5
Tugaske, Sask.	Weyburn L.	1921—56	36	19.5	10.8	1.80	15.9—23.1
Valjean, Sask.	Chaplin, Si. L.	1936—56	20	14.9	7.9	1.77	11.2—18.6
Acadia Valley, Alta.	Lacustrine C. & C.L.	1939—56	18	24.4	10.4	2.45	19.2—29.6
Bindloss, Alta.	Eolian Si. L.	1936—56	21	18.0	11.6	2.53	12.7—23.3
Foremost, Alta.	Lacustrine C.L. & Si.L.	1936—56	21	18.6	11.4	2.49	13.4—23.8
Lomond, Alta.	Glacial C.L.	1936—56	21	18.7	10.1	2.20	14.1—23.3
Whitla, Alta.	Glacial L. to Li. S.L.	1936—56	21	13.4	11.7	2.55	8.1—18.7
Group Averages				18.3	10.6	2.27	13.6—23.0
DARK BROWN							
Boissevain, Man.	Waskada C.L.	1939—56	18	28.3	7.1	1.67	24.8—31.8
Goodlands, Man.	Waskada,C.	1936—56	21	23.4	6.6	1.44	20.4—26.4
Crystal City, Man.	Carroll C.L.	1937—49	13	20.7	6.9	1.92	16.5—24.9
Lyleton, Man.	Souris F.S.L.	1936—56	21	24.5	7.4	1.62	21.1—27.9
Pipestone, Man.	Bede Co.S.	1935—56	22	8.3	3.3	0.70	7.2—10.2
Alameda, Sask.	Estevan C.L.	1936—56	21	20.5	10.7	2.34	15.6—25.4
Arcola, Sask.	Cudworth Si.L. & Oxbow L.	1938—56	19	22.4	9.9	2.27	17.6—27.2
Aylesbury, Sask.	Elstow C.L.	1938—56	19	19.2	12.0	2.75	13.4—25.0
Carmichael, Sask.	Cypress & Wood Mtn C.L.	1936—54	19	17.3	10.6	2.43	12.2—22.4
Conquest, Sask.	Asquith F.S.L.	1946—56	11	23.4	10.5	3.16	16.4—30.4
Guernsey, Sask.	Meota fine S.L.	1929—56	28	22.2	9.0	1.70	18.7—25.7
Radville, Sask.	Trossachs C.L.	1931—56	25	22.3	10.8	2.16	17.9—26.7
Rosetown, Sask.	Elstow Si.C.L.	1936—56	20	21.3	12.0	2.68	15.7—26.9
Strasbourg (H.), Sask.	Weyburn L.	1937—56	20	21.6	11.5	2.57	16.2—27.0
Strasbourg (C.), Sask.	Weyburn L.	1937—55	19	18.8	9.3	2.13	14.3—23.3
Castor, Alta.	Halkirk and Hughendon L.	1935—56	20	20.3	8.9	1.99	16.1—24.5
Chauvin, Alta.	Metiskow L.	1944—56	12	28.3	14.1	4.08	19.3—37.3
Claresholm, Alta.	Alluvial and Lacustrine F.S.L.	1939—56	18	23.0	6.2	1.46	19.9—26.1
Craigmyle, Alta.	Alluvial and Lacustrine Li.L.	1939—55	17	21.8	6.9	1.67	18.3—25.3

Drumheller, Alta.	Lacustrine Li.L. to H.C.	1942—56	15	32.2	8.5	2.20	27.5—36.9
Metiskow, Alta.	Wainwright S. & L.S.	1944—56	13	14.4	7.6	2.11	9.8—19.0
Nobleford, Alta.	Lacustrine H.C. to Si.L.	1939—56	18	34.5	12.7	2.00	28.2—40.8
Group Averages				22.2	9.2	2.18	17.6—26.9
BLACK							
Dugald, Man.	Red River C.	1929—52	23	28.5	9.5	1.98	24.4—32.6
Durban, Man.	Kenville C.L.	1949—56	8	39.4	11.9	4.20	29.5—49.3
Hargrave, Man.	Oxbow C.L.	1940—56	17	27.8	7.8	1.89	23.8—31.8
Katrime, Man.	Westbourne C.L.	1929—56	28	26.0	8.8	1.66	22.6—29.4
Silverton, Man.	Newdale C.L.	1937—48	11	30.2	11.6	3.49	22.4—38.0
Swan River, Man.	Medium L.	1930—47	15	27.4	7.1	1.83	23.5—31.3
Gilbert Plains, Man.	Sandy L.	1929—47	19	24.8	6.6	1.51	21.6—28.0
Grandview, Man.	Meharry C.L.	1950—56	7	27.5	9.5	3.60	18.7—36.3
Fleming, Sask.	Naicam & Ryerson C.L.	1949—55	7	26.2	6.4	2.42	20.3—32.1
Hafford, Sask.	Blaine Lake C.L.	1935—56	22	15.6	8.4	1.79	11.9—19.3
Kelliher, Sask.	Oxbow L. to Li.L.	1950—56	7	30.1	6.6	2.50	25.0—36.2
Wawota, Sask.	Ryerson L.	1931—56	26	20.9	8.4	1.65	17.5—24.3
Yorkton, Sask.	Canora Si.L.	1937—56	20	25.5	9.7	2.17	21.0—30.0
Baldonnel, B.C.	Codessa, F.S.L.	1943—55	12	32.5	13.4	3.87	24.0—41.0
Group Averages				27.3	8.4	2.47	21.9—32.8
GRAY BLACK							
Glenbush, Sask.	Glenbush & Whitewood L.	1930—53	23	24.6	12.0	2.50	19.4—29.8
Paddockwood, Sask.	Paddockwood L.	1933—56	24	20.8	6.4	1.31	18.1—23.5
Parkside, Sask.	Shellbrook Li.L.	1935—56	22	21.8	8.7	1.86	17.9—25.7
Star City, Sask.	Waitville L. and Pelly L.	1947—56	10	22.9	11.2	3.54	14.9—30.9
White Fox, Sask.	White Fox V.F.S.L.	1936—56	21	32.3	9.9	2.16	27.8—36.8
Group Averages				24.5	9.6	2.27	19.6—29.3
GRAY WOODED							
Glaslyn, Sask.	Waitville L.	1946—56	9	19.6	12.4	4.13	10.1—29.1
Loon Lake, Sask.	Loon River L.	1950—56	7	24.0	7.8	2.95	16.8—31.2
Snowden, Sask.	Garrick L.	1942—56	15	28.0	11.3	2.92	21.8—34.2
Athabasca, Alta.	Breton L. and Falun L.	1948—56	9	31.7	13.0	4.33	21.7—41.7
Deadwood, Alta.	Nampa C.L.	1944—55	12	37.2	13.1	3.79	28.9—45.5
McLennan, Alta.	Nampa H.L. to C.L.	1947—56	8	29.5	8.5	3.00	22.4—36.6
Group Averages				28.3	11.0	3.52	20.3—36.4
RENDZINA							
Arborg, Man.	Arborg H.C.L.	1929—53	25	26.2	7.4	1.48	23.2—29.2

KEY TO ABBREVIATIONS:

L.—Loam	S.—Sandy	F.—Fine
C.—Clay	Si.—Silt	Co.—Coarse
H.—Heavy	Li.—Light	V.—Very

Table 4 shows that mean yields increased from the Brown to the Black soil zones. The data for the Gray Black, Gray Wooded and high-lime Rendzina soil zones were too limited to provide conclusive results. Nevertheless, it is apparent that Gray Black and Gray Wooded soils will produce good crops of wheat on summerfallow. Yields varied more widely on Gray Wooded soils than on any other except Brown soils.

SOIL FERTILITY AND MANAGEMENT

The influence of application of plant nutrients on production of forage, cereal and horticultural crops was studied on many illustration stations. The locations of the stations provided opportunities to study the effects of various agronomic practices on crop production under diverse soil and climatic conditions and to conduct research on the relationships between factors affecting crop response.

In 1958, 142 tests dealing with the macro-nutrients (N, P, and K) and eight studies with micro-nutrients were undertaken in co-operation with other divisions of the Experimental Farms Service. Soil management studies, carried out at 60 locations, dealt with rotations (21 experiments), tillage practices (23), cropping practices (6), residual effects on crops (3), and soil conditioners (7).

Response to Fertilizers

In the Atlantic Provinces, studies of the main and interaction effects of nitrogen, phosphorus and potassium on the yields of forage crops and potatoes received first consideration. Applications of the elements were evaluated by yields of dry matter and by chemical analyses: the percentage of starch in potatoes and of protein in forage, the analyses being made in co-operation with Science Service laboratories. In addition, rates of application of limestone, and time and rates of application of commercial fertilizer formulations, were studied on most of the illustration stations (Figure 2). A trace element study was con-

Figure 2—The effect of 1,000 lb. per acre of lime on herbage after five cuts at Fenwick, N.S. The area on the left had no lime.

ducted in co-operation with the Nova Scotia Department of Agriculture in the Kentville district at Yarmouth, Lunenburg, Mavillette and Rawdon. The trace elements applied were molybdenum, manganese, boron, zinc, cobalt and copper. The soil and forage material at each of these locations was analyzed for each of these elements.

In Ontario and Quebec, in the districts of Lennoxville, eastern Ontario, and north-central Ontario (Mindemoya), the responses of forage and cereal crops to nitrogen, phosphorus and potassium applications were studied in a $3 \times 3 \times 3$ factorial experiment on a four-year crop rotation of hoed crops, grain, hay, and hay.

In the Kapuskasing district, on the Genier illustration station in Ontario, a similar study was conducted on potatoes. On the Guyenne illustration station in Quebec, the effects of three rates of application of nitrogen, phosphorus and calcium on the production of hay were studied in a factorial experiment at four depths of plowing.

In the Fort William district of Ontario, studies on the effects of various rates of application of commercial fertilizer on the production of cereals, forage and potato crops were conducted at the Fort William District Experiment Substation and at the Fort Frances illustration station.

In the Prairie Provinces, a regional study begun on 66 illustration stations in 1951 was completed in 1955. The effects of different rates of the commercial fertilizers ammonium phosphate (11-48-0 and 16-20-0), triple-superphosphate and ammonium nitrate on the yield of wheat on fallow were studied. The residual effect of commercial fertilizers on the yields of cereal crops was studied on the illustration stations in the Scott, Sask., supervisory district. In 1955, the entire study was revised to evaluate the main and interaction effects of plant nutrients on the production of cereal crops on fallow and stubble land. The revised treatments were tested in a factorial experiment of four levels each of nitrogen and phosphorus. By this approach, the relative availability of the nutrients in the soil and the optimum level at which each nutrient should be applied is determinable. From this information the most suitable commercial formulations and rates of application can be readily ascertained. The study is being conducted on 60 soil types across Manitoba, Saskatchewan and Alberta. At several locations, a level of potassium is included in the experiment to evaluate the extent of a potassium deficiency. Cereal crops on the Lenswood illustration station in Manitoba have shown a definite response to an application of potash. On the Gray Wooded soil substations in the Prairie Provinces, studies are being conducted on the effects of nitrogen, phosphorus, potassium, and sulfur on the production of cereals and forage crops. Data from these studies, up to 1955, were reported in the publication "Fertility and Management Studies on Gray Wooded Soils, Progress Report, 1927-1956" (Canada Department of Agriculture, Illustration Stations Division).

Pastures (Eastern Canada)

Since the publication of the divisional progress report for 1948-1953, the project on pasture fertility (Eastern Canada) was concluded. Table 5 is a summary of the data. The value of production resulting from the various fertilizer treatments was measured in terms of pounds of beef per acre, assuming that 8.1 pounds of dry matter were needed to produce 1 pound of beef, and valuing the beef at 20 cents a pound.

The largest 'net return', $102.60 per acre after subtracting fertilizer cost from value of production, resulted from an annual application of complete fertilizer containing 20 pounds of nitrogen, 120 pounds of phosphate and 60

TABLE 5.—ANNUAL AVERAGE YIELDS OF FERTILIZED PASTURE AND RETURNS OVER FERTILIZER COST, ILLUSTRATION STATIONS IN EASTERN CANADA, 1944–55

Treatment			When Applied	Dry Matter Produced per Acre, Cwt.						Value of Production per Acre	Fertilizer Cost per Acre	Net Return per Acre[a]
N	P_2O_5	K_2O		P.E.I.	N.S.	N.B.	Que.	Ont.	Average all Stations			
lb./ac.	lb./ac.	lb./ac.								$	$	$
—	—	—	Check	33.6	23.0	21.4	23.6	20.7	24.5	61	—	61.00
0	120	0	every 3 years	43.4	46.9	30.9	31.9	31.0	36.8	92	4.80	87.20
0	120	60	every 3 years	45.1	47.4	33.7	34.3	33.3	38.8	97	6.00	91.00
20	0	0	annually	49.8	51.4	37.6	36.8	35.6	42.2	105	9.40	95.60
0	120	60	every 3 years									
20	120	60	annually	66.1	55.9	45.4	41.0	40.8	49.8	124	21.40	102.60
Number of Tests in 12 years				47	122	89	311	133	702			

[a] Over fertilizer cost only.

pounds of potash. Phosphate alone applied every three years was more productive than either nitrogen or potash, alone or together, in terms of yield increases.

This analysis assumes that total annual production is converted into a salable product. However, as a result of fluctuations in plant growth rate over the season, not all of the forage produced may be used.

Results of other pasture fertility, renovation and species-mixtures studies conducted on illustration stations appear in the progress reports of experimental farms associated with the stations.

Potatoes (Fort William, Ontario)

The response of potatoes to applications of fertilizer was studied at Fort William from 1953 to 1957. The experiment was conducted on a clay loam soil of the Slate River Valley on small plots with four replications; two were manured at 12 tons per acre and two were not manured. The first six treatments listed in Table 6 were applied each year of the test; the last two treatments, at the heavier rates, were applied in 1956 and 1957. Statistical analysis of the data indicated significant effects from treatments with chemical fertilizer but none from manure.

The yields with and without manure were averaged for each treatment. Yields given for the two heaviest treatments were calculated for the 1953-57 period on the basis of the increases in yield in relation to the check for 1956 and 1957. This was necessary in order to make cost of production calculations comparable for the whole period of the test. The average yield for the check for 1956 and 1957 was 163.6 bushels per acre in comparison with 199.4 bushels for 1953 to 1957.

TABLE 6.—RESPONSE OF POTATOES TO FERTILIZER TREATMENTS, FORT WILLIAM, 1953–57

Treatment per Acre (average, with and without manure)	Marketable Potatoes per Acre	Cost of Production		Profits[a] at $1.00 per Bushel	
		Per Acre	Per Bushel	Per Acre	Per Bushel
	bu.	$	$	$	¢
Check—no fertilizer	235.3	280.00	1.190	−44.70	−19.0
300 lb. 2–16–6	297.5	306.72	1.031	−9.22	−3.1
800 lb. 2–16–6	353.4	337.87	0.956	15.53	4.4
1,300 lb. 2–16–6	379.2	360.59	0.951	18.61	4.9
800 lb. 4–24–12	399.8	362.06	0.906	37.74	9.4
1,800 lb. 2–16–6	418.8	387.18	0.924	31.62	7.6
2,300 lb. 2–16–6	456.8	413.32	0.905	43.48	9.5
2,800 lb. 2–16–6	429.1*	421.06	0.981	8.04	1.9
3,300 lb. 2–16–6	446.2*	441.35	0.989	4.85	1.1

[a] Return for risk-taking and management.
* Calculated for 1953 to 1957 on basis of yields in 1956 and 1957.

Differences in cost of production between treatments were calculated. Allowances were made for additional costs of picking and bags for the higher-yielding treatments. Basic cost of production, without any fertilizer, was $280 per acre. This cost was calculated for a total of 8.5 acres and included a special investment of $1,345 for potato equipment. Cost of production per acre increased with increasing fertilizer applications while cost of production per bushel declined with increasing applications, and correspondingly increasing yields, up to the 2,300-pound rate. At this level, cost of production per bushel was lowest and profit per acre highest.

These results indicate that potatoes can be produced most economically in this area with applications of 2-16-6 (or equivalent in plant nutrients[1]) at 2,300 pounds per acre. In this analysis, a price of $1.00 per bushel was assumed, a price well below the average obtained by growers in this area in recent years. 'Profits' per acre, or the return for risk-taking and management, at this price amounted to $43.48 per acre, or 9.5 cents per bushel. Applying this 'profit' to the total acreage used for cost of production calculations, namely 8.5 acres, would yield a total 'profit' of $369.58. This is an annual return above costs of production, which included a labor charge at the current rate and a charge of 27.5 per cent of the special investment for potato equipment.

FARM CROPS

Studies of farm crops on illustration stations are largely regional adaptation trials. New selections developed by plant breeders are compared with those commonly grown. In 1958, testing of cereal crop varieties represented the largest number of trials, a total of 352, of which spring wheat accounted for 98, oats for 128, and barley for 126. Flaxseed varieties were tested at 52 stations in Western Canada. Co-operative forage crop tests, to determine the best-adapted species and combinations of grasses and legumes for different soil and climatic conditions, were conducted on 170 illustration stations. Variety testing of potatoes was conducted on five stations, other horticultural crops on 21, fiber flax on two, tobacco varieties at one in Quebec, and rape and kale at one in Saskatchewan.

WEED CONTROL

Experiments on illustration stations in connection with weed control and eradication are conducted mostly with selective herbicides but cultural methods are under study also. Studies on methods of controlling weeds in cereal, hay and pasture crops were conducted on 20 illustration stations in the districts of Charlottetown, P.E.I., Normandin, Que., north-central Ontario, Scott, Sask., and Beaverlodge, Alta. Research work has been most extensive in the Scott, Sask., district where cultural, chemical and combined cultural-chemical methods of control have been applied on such weeds as toadflax (*Linaria vulgaris*), green foxtail (*Setaria viridis*), Canada thistle (*Cirsium arvense*) and perennial sowthistle (*Sonchus arvensis*). Large-scale trials on weed control methods have also been conducted on certain illustration stations.

LIVESTOCK MANAGEMENT

Two livestock management projects were initiated in 1957-58 on illustration stations. Both of these were in co-operation with the Animal and Poultry Science Division. One of the projects was a study to determine whether criss-crossing, with good selection and management, is as profitable as the rotational crosses now recommended for the production of market lambs. This project is conducted at St-Urbain, Que. (Normandin district) and St-Sébastien, Que. (Lennoxville district). Figure 3 shows a view of the flock at St-Urbain. First-year results at St-Sébastien, where 16 ewes were bred to an open-face Shropshire ram and 16 to a Suffolk ram, showed that at marketing time the average

[1] This could be 1,150 pounds of 4-24-12 plus 460 pounds of 20 per cent superphosphate. This treatment could result in increased profits as it would cost about $61.00 per acre as compared with $67.00 per acre for 2,300 pounds of 2-16-6. In addition, there would be a smaller volume of material to handle.

weights of lambs in the first group were 84 pounds (live) and 40 pounds (dressed) while the second group averaged 92 pounds and 43 pounds respectively.

The second project is a study on using performance-tested sires in a herd of commercial beef cattle. This study was initiated in late 1957 at Mindemoya, Ont. (Manitoulin Island).

Figure 3—The flock of sheep used to compare criss-crossing with rotational crossing for the production of market lambs at St-Urbain, Que.

FARM MANAGEMENT

In 1958 the farm management projects (counted by locations) totaled 1,023. These were carried out on 193 illustration stations. Average acreages and capitalization of the stations, compared with Census of Agriculture data for all farms, were as follows:

Region	Illustration Stations	All Farms
Eastern Canada (92 locations)		
Capitalization	$26,929	$12,543
Total acreage	234	134
Cultivated acreage	111	74
Prairie (84 locations)		
Capitalization	$52,039	$18,890
Total acreage	944	546
Cultivated acreage	679	326
British Columbia (17 locations)		
Capitalization	$38,676	$15,461
Total acreage	478	183
Cultivated acreage	96	47

The census data include many small farms that are considered less typical of the region than are the illustration stations. Also, the capitalization data for illustration stations include the value of feeds and supplies on the farm, whereas the census data do not. Farm management data obtained on a farm such as the illustration station at Nobleford (Figure 4) are useful in evaluating the benefits of a contour-farming program to farm unit.

Figure 4—Contour farming to conserve moisture and prevent soil erosion at Nobleford, Alta.

Farm Business Studies

The data obtained from the general farm business study of these illustration stations were analyzed for the four-year period 1953-56 on a regional basis (Table 7) and by type of farming[2] (Tables 8-10). Since these farms were not selected specifically for a farm business study or as being representative of a region or type of farm, the results should not be applied generally. However, certain of the efficiency factors that were derived (Table 9) for the various types of farming on illustration stations probably indicate what one would find on many similar farms of the same size.

The analysis by regions (Table 7) indicated that, although capital turnover (years for cash income to equal total capital) was slowest on the prairie illustration stations, cash operating expenses per dollar of cash income were lowest.

The stations in the regions listed in Table 7 were as follows:

Atlantic—stations in Newfoundland, Nova Scotia, Prince Edward Island and New Brunswick and two stations on the Magdalen Islands (Quebec).

Central — stations in Quebec and Ontario. There are no illustration stations in southern Ontario.

[2] Type of farming was determined on the basis of the principal source of farm revenue. Where at least 50 per cent of the farm income was obtained from one enterprise then that enterprise determined the type of farming.

Prairie — stations in Manitoba, Saskatchewan and Alberta and in the Peace River district of British Columbia.

Pacific — stations in British Columbia except those in the Peace River district.

Unreliable and incomplete data were omitted.

TABLE 7. SUMMARY OF FARM MANAGEMENT DATA FOR ILLUSTRATION STATIONS IN CANADA, 1953-56, BY GEOGRAPHIC REGION

Factor	Unit	Average per Station			
		Atlantic 157*	Central 244*	Prairie 358*	Pacific 72*
Total Farm Area	ac.	176	224	913	254
Total Owned Area	ac.	169	198	724	237
Cultivated Area	ac.	72	120	645	97
Capital Investment:					
Land and Fences	$	3,172	5,979	10,902	8,120
Buildings	$	5,414	7,012	7,516	7,127
Livestock	$	3,000	4,772	5,041	5,447
Machinery	$	5,041	6,937	14,780	7,241
Feeds and Supplies	$	2,486	2,172	11,601[1]	3,089
Total	$	19,113	26,872	49,840	31,024
Total Labor Supply in Man-months		24	26	21	22
Cash Farm Income	$	5,944	7,031	11,000	7,532
Cash Operating Expenses[2]	$	3,722	4,182	5,620	4,941
Analysis Factors:					
Cultivated Area of Total	%	40.9	53.6	70.6	38.2
Cash Operating Expenses per Dollar of Cash Farm Income	$	0.63	0.59	0.51	0.66
Cash Farm Income per Cultivated Acre	$	83	59	17	78
Years for Cash Farm Income to Equal Total Capital	No.	3.2	3.8	4.5	4.1

* Number of farm-years in group.
[1] Including grain held for sale.
[2] Does not include depreciation charges or interest on investment.

In the analysis by types of farming, illustration stations producing grain, hay and forage seeds had the largest cultivated area and the largest amount of farm capital. Farms producing various crops and livestock (including livestock products) with non predominating were the second largest in cultivated area but beef cattle farms were the second largest in total amount of capital (Table 8).

The distribution of farm capital among the various classes is given in Table 9. The proportion of capital in land and fences was highest on those farms on which crop production was most important or relatively important. Buildings made up the greatest proportion of capital on station farms producing mixed vegetable crops. Machinery amounted to 25 to 31 per cent of farm capital on all types except mixed vegetable farms, which averaged 15.4 per cent. Feeds and supplies on hand, including crops on hand at the end of the year, were highest on farms producing grain, hay, forage seed, and potatoes.

The analysis by type of farming (Table 10) indicated that cash operating expenses in relation to cash income were lowest on the mixed vegetable farms, followed closely by the grain, hay and forage seed farms. For five of the eight types for which data are given, costs per $1.00 of income ranged from 58 to 64 cents. Rate of capital turnover, measured by years for cash income to equal total capital, was highest on the poultry farms and lowest on the beef cattle farms. Average value per acre of land, including fences where required, was lowest on the poultry and beef cattle farms and highest on mixed vegetable farms.

TABLE 8.—AVERAGE SIZE OF FARM AND AVERAGE FARM CAPITAL BY TYPE OF FARM[a], ILLUSTRATION STATIONS, 1953-56

Type of Farm	Farm-Years[b]	Total Farm Area	Cultivated Area	Land and Fences	Buildings	Livestock	Machinery	Feeds and Supplies	Total Capital
	No.	ac.	ac.	$	$	$	$	$	$
Mixed Livestock, including Dairy Products	279	397	197	5,622	6,455	5,236	7,924	3,224	28,461
Grain, Hay and Forage Seed	212	1,036	813	13,252	7,581	3,630	16,652	15,963[1]	57,078
Dairy	185	200	105	5,958	7,786	4,849	7,065	2,320	27,978
Mixed Crops and Livestock, including Dairy Products	53	568	319	7,463	5,821	4,339	9,442	4,407	31,472
Beef Cattle	29	578	265	7,592	6,584	9,863	11,855	5,530	41,424
Poultry	20	323	185	4,342	5,458	3,784	6,890	2,044	22,518
Potatoes	16	151	89	4,737	7,611	1,956	7,887	6,056	28,247
Mixed Vegetable Crops	14	73	54	3,507	6,131	2,142	2,334	1,011	15,125

[a] Data for three types of farms for which there were only a limited number of observations were excluded.
[b] Total records for period.
[1] Including grain held for sale.

TABLE 9.—DISTRIBUTION OF FARM CAPITAL BY TYPE OF FARM, ILLUSTRATION STATIONS, 1953–56

Type of Farm	Land and Fences	Buildings	Live-stock	Machin-ery	Feeds and Supplies	Total
	%	%	%	%	%	%
Mixed Livestock, including Dairy Products	19.8	22.7	18.4	27.8	11.3	100
Grain, Hay and Forage Seeds	23.2	13.3	6.3	29.2	28.0	100
Dairy	21.3	27.8	17.3	25.3	8.3	100
Mixed Crops and Livestock, including Dairy Products	23.7	18.5	13.8	30.0	14.0	100
Beef Cattle	18.3	15.9	23.8	28.6	13.4	100
Poultry	19.3	24.2	16.8	30.6	9.1	100
Potatoes	16.8	26.9	6.9	27.9	21.5	100
Mixed Vegetable Crops	23.2	40.5	14.2	15.4	6.7	100

TABLE 10.—TOTAL LABOR SUPPLY, INCOME, EXPENDITURES AND SELECTED EFFICIENCY MEASURES BY TYPE OF FARM, ILLUSTRATION STATIONS, 1953–56

Type of Farm	Total Man-Labor	Cash Farm Income	Cash Operating Expenses[a]	Cash Operating Expenses Per Dollarof Cash Farm Income	Average Value Per Acre of Land and Fences	Years for Cash Farm Income to Equal Total Capital
	Months	$	$	$	$	Number
Mixed Livestock, including Dairy Products	23	6,472	3,965	0.61	17	4.4
Grain, Hay and Forage Seed	21	12,959	5,993	0.46	16	4.4
Dairy	27	8,002	4,943	0.62	32	3.5
Mixed Crops and Livestock, including Dairy Products	20	6,391	3,701	0.58	17	4.9
Beef Cattle	21	7,096	4,383	0.62	14	5.8
Poultry	21	10,204	7,610	0.75	14	2.2
Potatoes	26	8,780	5,584	0.64	32	3.2
Mixed Vegetable Crops	24	5,044	2,193	0.43	53	3.0

[a] Does not include depreciation charges or interest on investment.

Single Enterprise Studies

In 1958, studies of single enterprises were conducted at 129 illustration stations. These were conducted jointly with other projects or as special developmental projects. Costs of producing farm crops, including all known production costs at current prices, were determined for 84 locations in Western Canada, mainly in connection with a study of cropping sequences. Milk production costs were studied at 37 locations in Eastern Canada and British Columbia, largely in relation to milk production and herd improvement. Other single enterprise studies were conducted in connection with poultry production, feeder cattle, apiculture and seed production costs.

A study was made in 1957 of costs of producing wheat on fallow at 80 locations in the three prairie provinces. The data are given in Table 11 and classified by location into three subgeographic zones according to soil group. On a basis of costs per acre (but not on a basis of costs per bushel), the differences between these three groups are highly significant. It should be noted that these data pertain only to 80 widely separated locations. However, they indicate that significant differences in production costs per acre for spring wheat on fallow exist between regions but, because of compensating differences in yields, the costs per bushel are relatively uniform.

TABLE 11.—COST OF PRODUCING SPRING WHEAT ON SUMMERFALLOW ON VARIOUS SOIL GROUPS, 1957

Soil Group	Number of Locations	Number of Crop-Years	Cost per Acre	
			1957**	Average
			$	$
Black and Gray Black	28	286	21.15	17.87
Shallow Black and Dark Brown	30	435	19.94	15.51
Brown	22	320	17.38	12.97
All Groups	80	1,041	19.66	15.64

** Data Significantly different at the P = .01 level.

Costs of Operating Farm Machinery

Costs of field operations in the prairies were studied at 71 locations. For self-propelled grain combines the 1957 data on costs per acre of operating them on 40 illustration stations are given in Table 12. As the size of the machine increases, as measured by table width, the cost per acre decreases. However, there is considerable overlapping in costs between machines of different sizes since grain combines can usually be obtained in two table sizes for the same cylinder capacity. There were no statistically significant differences in average use of machines in the different size groups; use averaged 122 hours per combine. Operating costs included interest on investment, allowances for depreciation and repairs, fuel oil, grease and labor for operating the combine. Interest was charged at 6 per cent on average investment; depreciation and repairs were based on probable-life estimates of 2,000 hours, repairs being charged at 150 per cent of machine value. Fuel, oil and grease charges were based on current prices. Labor was charged at $1.05 per hour.

TABLE 12.—RELATIONSHIP OF COSTS OF OPERATING SELF-PROPELLED GRAIN COMBINES TO SIZE OF MACHINE, ILLUSTRATION STATIONS, 1957

Size of Grain Combine (table width)	Number of Machines	Operating Costs per Acre			Annual Use[a]
		Average**	High of all Records	Low of all Records	
		$	$	$	hr.
10-foot	6	4.62	5.51	3.68	127
12-foot	15	3.16	5.03	1.98	103
14-foot	10	2.10	3.05	1.65	124
16-foot	9	1.76	2.06	1.15	150
	40	2.80	5.51	1.15	122

** Data significantly different at the P = .01 level.
[a] Data are not significantly different.

Apiculture Management Studies

In 1956 a project was initiated on a special illustration station at L'Assomption, Que., in co-operation with the Apiculture Division, to compare the returns from "package" and "overwintered" bees. There are 50 colonies of bees under each type of management, half of each group being at one location and the rest at another. An apiary of 50 colonies was considered optimum for the flora of the area. Each year to date the "overwintered" colonies have led in production of honey per colony and in returns for labor.

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